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THE RELATIVE ADVANTAGES OF A CLASSICAL AND SCIENTIFIC EDUCATION.

BY J. C. THORPE, ESQ., M.A., F.I.C.

I HAVE much pleasure at the request of the Parents' National Educational Union in expressing my views on the comparative values of a classical and scientific education. I think for an opinion on this subject to be of value it should proceed from one who has had a combined classical and scientific training. This it has been my good fortune to have had. My experience as a teacher has been with boys, and my remarks, though perhaps applicable to girls must be taken as applying mainly to boys.

The subject is a very wide one, and only an elementary and somewhat incomplete treatment of it is possible within the limits of the time allowed me. In many schools at the present time a conflict is proceeding between science and the classics. Such a conflict should not be possible. Every good system of education ought to have its literary and its scientific side, and the conflict should be between the classics and modern languages rather than between the classics and science. We have, however, to take things as we find them, and the struggle for pre-eminence is more especially just now between science and Latin and Greek. Some of the advantages of a classical education are acknowledged by all. It takes the student into a world quite different from his own, and introduces him to phases of thought and feeling entirely foreign to modern life. It brings him into direct and living contact with the most beautiful literary productions of ancient times. It gives him the opportunity of reading history in the original, as written by men who took an active part in the events which they relate. It enables him to study philosophy at the fountain-head when he reads his Plato and his Aristotle. These are real and solid advantages, but they are only to be enjoyed by the favoured few who besides being really able boys, have passed up through the school and reached the classical sixth. If we contrast

the advantages derived respectively from a classical and scientific education by the average boy, we shall find that a classical education is over-rated, while the advantages to be obtained from an efficient scientific training are only understood by the few. No solid arguments can be brought forward to support the contention that the classics afford a better mental training than any other subjects. Most subjects, if they are well-taught by a capable enthusiastic teacher are of real educational value ; different subjects, have their different uses, but the special value of any particular subject from the point of view of training has been greatly exaggerated, and the way the subject is taught has quite as much to do with its value as an educational medium, as the subject itself.

An exclusive classical training, or one perhaps combined with a minimum of mathematics, and a little history, has a narrowing tendency. If this is not always evident, if indeed the contrary sometimes seems to be true, it is due to the fact that for years all the able boys in our great public schools have received a classical training. In schools where the material on the modern side is as good as that on the classical the comparative helplessness and lack of initiative produced by an exclusive literary training is more apparent. It is claimed that the writing of good English prose is taught by the translation of Latin and Greek. There is a great temptation when translating to slavishly follow the original, and all who have done much of this kind of work, know that it is advisable to finally read over and correct a translation without looking at the original in order to avoid incorrect and unidiomatic English. This process tends to make it depart somewhat, if only slightly, from the original. The great writers of English did not learn how to write by translation, or by the study of other languages, but by reading the best English authors. John Bright, the greatest parliamentary orator of the latter half of the last century, did not have a classical education but owed his magnificent flow of English to the study of the Bible. As Bain remarks, the old Greeks and the French, the two nations most remarkable for their skill in manipulating their own language, are the two nations who have always neglected other languages and attended to their own. The French to-day do not rank with the Germans as linguists, but as writers of elegant prose in the mother-tongue they far excel them. Although it doubtless is a valuable exercise to translate a piece of Latin or Greek into English, not so much becauses it teaches a boy to write good English as because it teaches him to think, yet French or German can take the place of the ancient languages in this respect. The greater difficulty in finding out the meaning of the ancient languages as compared with the modern is a disadvantage in the case of young boys and only tends to discourage them. With more advanced pupils doing more advanced work, just as high an order of ability is required to translate modern languages, and more particularly French, into really good English ; and the pupil is not labouring under the disadvantage of doing two things at once and therefore, more often than not, doing them both badly. In translating a difficult piece of Latin you have first to find the meaning and then to choose suitable English to clothe your meaning ; in translating even difficult French—and it must be remembered I am speaking only of advanced pupils—the meaning is at once apparent and all that has to be done is to choose the English idiom which exactly expresses the French. I may instance some of the pieces of French given in the monthly competitions of the *Journal of Education*, which, though admittedly difficult, an able boy in a modern sixth would understand, yet, though the meaning of the French may be apparent at sight, it requires very considerable thought and an extensive knowledge of English to choose the words and phrases which idiomatically render the French, and this knowledge can only be obtained by the wide reading of the best English authors.

A very serious objection to the study of the classics is the unsuitability of the subject matter of some of the books usually read. We all recognise the beauty of the language and thoughts of the Greek dramatists. Everyone with any literary taste must read Homer and Horace with the keenest pleasure. Demosthenes and Cicero remain to-day models of elegant and forcible prose. Some of the books, however, usually read in our schools are intolerably dull, such as Xenophon's *Memorabilia*, and Cicero's *De Senectute* and *De Amicitia*, or else quite unsuitable for young boys, despite the beauty of the diction, such as parts of Ovid, some of the Odes of Horace, and parts of Catullus. So many words and roots in English are of Latin origin that Latin for this, if for no other reason, should remain in the school curriculum. An extensive experience as a teacher of modern languages has, however, convinced me that it is quite the exception for boys to utilise their Latin in interpreting a French word derived from that language, if they have not previously met with the word ; the relationship between the two words may be perfectly obvious as between *donum* and *don*, *arbor* and *arbre*, *bestia* and *bête* ; but it is quite possible for the master after saying that the word is derived from the Latin, to pass it round a form of twenty boys averaging fourteen years of age without one boy giving the meaning of the word ; in the case of the first of the instances given above, this was actually my experience ; it is only fair to say that such boys have not studied French grammar historically, such studies usually coming later on. In the case of Greek it is my personal experience that the Greek learnt at school by a boy who has passed the Joint Board, the standard of which is high, is of very little use in arriving at the meaning of scientific words. The utility of Greek in this respect is one of the reasons advanced for its study.

Most of our scientific words except those used in the nomenclature of certain sciences such as botany and zoology are derived from the Greek. Of the some two hundred scientific words of Greek origin which I now freely use, the Greek which I learnt at school has perhaps taught me the meaning of from ten to twenty ; the others I have learnt while studying science, and with a knowledge of the Greek alphabet I could have learnt them without a classical education. In many cases even an advanced Greek scholar cannot by a process of reasoning arrive at the meaning of the word. Histology which is the science dealing with the microscopic structures in the bodies of plants and animals, should mean according to derivation the science of webs, while barometer should mean balance, or weight measurer in that sense, rather than possess its present signification, for the Greek does not embrace the idea of air.

Science is associated in the minds of many with nasty smells, test-tubes and general waste of time. Such people naturally do not appreciate the advantages of a scientific training. In nothing are these advantages more apparent than in the habit of correct observation it engenders, and second only to this is the practice in manipulation it affords. For science teaching to afford a training to the eye and to the hand and be in this respect of real educational value certain conditions are essential, conditions which do not always exist in schools. First and foremost the boys must themselves do a large amount of work in the laboratory. Experience has taught me that it is not the same thing for a boy to see an experiment done as it is to do it himself; the same permanent mental impression is not left by an experiment performed by another person as by one you have made yourself. It may be necessary in the case of very young boys to take them through a preliminary lecture course, but it is a question whether if boys are too young to do simple experiments they are not too young to benefit by science teaching. I am of opinion that chemistry should not be begun too early, but that young boys should be employed with simple problems in physics, which they can more easily understand. For the teaching of advanced laboratory work in science small classes and liberal expenditure on apparatus are essential. This is one of the reasons why science teaching has great difficulty in making head way. Small classes and expensive apparatus mean that science teaching to be efficient must be much more costly than work of a literary character for which only a few books are necessary. If this country is to hold her own in her struggle for commercial supremacy, our municipalities and other bodies controlling education must recognise this and ungrudgingly supply the best equipment. Younger boys can be worked in classes of between twenty and thirty and with inexpensive apparatus, though here again it is of course more costly for every two boys to have a set of apparatus than for the master to perform the experiment before the class.

The teacher should have time given him to keep abreast of the scientific discoveries of the age, and it is advisable for him to be an original worker if only in a small field. Few science teachers at present have time to attain to this ideal state of things. It will be generally conceded that a classical

training does not teach a boy to use his hands, but habits of observation are engendered by both classical and scientific studies. The observation inculcated by attention to books seems often not to be carried outside the class-room or study; it appears to fail to make a man more observant in the great world beyond. In the laboratory, and especially is this so in the case of the Biological sciences, the ocular training is of a kind more comparable with that acquired in the world and therefore of greater practical utility. A practical course in science teaches classification or the orderly arrangement of facts, and in sciences such as chemistry, this goes hand-in-hand with lessons on inductive reasoning or the proceeding from the particular to the general. A classical education perhaps teaches deductive but certainly not inductive reasoning. Many are, however, of opinion that the reasoning faculties are not exercised in literary studies. Whether the reasoning processes gone through in a course of science are inductive or deductive depends on the way in which the science is taught. The methods very often employed make the reasoning processes merely deductive, but the more modern teachers are introducing inductive methods. A boy, for example, passes hydrogen gas over various heated powders and he finds that in each case water and a metal are produced, he groups together compounds behaving as described and when the term oxide is applied to them he has an intelligent idea of its meaning. Again, a student of botany may, by proceeding from the particular to the general, form his own classification. This is the inductive method, though more often perhaps he does the reverse, and proceeding from the the general to the particular finds out by deductive reasoning the name of the plant with the help of a system of classification.

A scientific training teaches accuracy of thought and language. The great fault of the old systems of education which do not include science, is that the memory is exclusively exercised and the reasoning faculties are neglected. Many practical failures in life are due to inability to reason; if a boy has been taught to reason when at school he will not fail to do so when engaged in the business of life after his school days are over. Science is the most perfect embodiment of truth, it teaches us to accept nothing which is not thoroughly accredited and to reject everything put forward on insufficient evidence. The history of Harvey's researches leading up to the discovery of the circulation of the blood, or of Claude Bernard's investigations on the function of the glycogen in the liver shew the enormous labour and care involved in arriving at the truth, and how complete the evidence must be before the final conclusion is reached. It is sometimes said that science does not train the imagination; but to grasp the ideas associated with atoms and molecules, or to form a mental picture of what is happening when chemical combination between the smallest conceivable particles is taking place requires a considerable effort of the imagination, and yet on the other hand science discourages superstition, for every scientific fact must be capable of exact proof before it can be finally accepted. All scientific pursuits embracing a practical course of study are capable of affording a very large amount of pleasure to many boys who have little taste for literary studies, and in this way many a boy is led to acquire useful information and to spend his time profitably and is saved, particularly if he has no liking for athletics to counteract evil tendencies, from becoming a danger to himself and to society. Many of us must be struck with the increase of scientific and the decrease of classical allusions in the daily papers, not so very long ago a good parliamentary debate was full of classical quotations, this is no longer the case, the habit of indulging in classical quotation seems to be dying out; on the other hand it is quite impossible to-day without some scientific training to understand a great deal in our daily papers and reviews.

The time has arrived when a man cannot be called educated without some knowledge of science, and the time has gone by when a man to be educated must have a knowledge of Latin and Greek. Modern progress is the progress of scientific discovery, and the man whose education has been exclusively classical must be content—and I regret to say very often is content—to go through life without understanding or appreciating the wonders which nature and man controlling nature have to offer. "The proper study of mankind is man," as Pope has said, but how can man be understood in this age of progress if he is entirely dissociated from the wonderful

scientific discoveries which daily shew his superiority to the brute creation? We should all, I believe, lead healthier lives if we knew more about our own bodies, but the study of the physiology of our bodies is impossible without a preliminary scientific training. Without some geological knowledge we cannot understand the past history of our planet and follow the contest still proceeding between science and religion.

In conclusion it seems that in the near future Greek is destined to disappear from our school curriculum. Latin will probably remain but be taught with reference to the modern languages derived from it, so that a limited amount of Latin, modern languages and science with a sound English and mathematical training will represent a combined literary and scientific education.